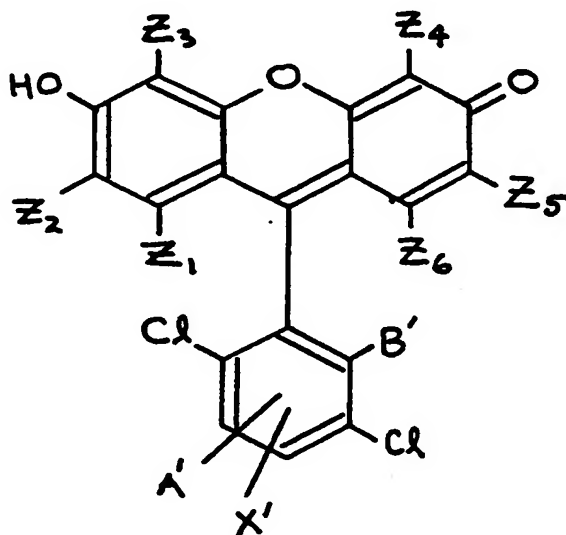


WE CLAIM:

1. In a method of detecting a plurality of electrophoretically separated classes of DNA fragments, an improvement comprising labelling DNA fragments of at least one class with a 4,7-dichlorofluorescein dye.
2. The method of claim 1 wherein said 4,7-dichlorofluorescein dye is defined by the formula:



wherein:

A' is hydrogen, fluoro, chloro, a linking functionality, or a group that may be converted to a linking functionality;

B' is fluoro, chloro, or an acidic anionic group;

X' is hydrogen, fluoro, or chloro;

Z1 is hydrogen or, when taken with Z2, benzo;

Z2, when taken alone, is hydrogen, halo, lower alkyl, lower alkyloxy, a linking functionality, or a group that may be converted to a linking functionality, or when taken with Z1, benzo;

Z3 and Z4 are separately hydrogen, halo, lower alkyl, lower alkyloxy, a linking

functionality, or a group that may be converted to a linking functionality;

Z₅, when taken alone, is hydrogen, halo, lower alkyl, lower alkyloxy, a linking functionality, or a group that may be converted to a linking functionality, or when taken with Z₆, benzo;

5 Z₆ is hydrogen or, when taken with Z₅, benzo; and wherein at least one of A, Z₂, Z₃, Z₄, and Z₅ is a linking functionality or a group that may be converted to a linking functionality.

3. The method of claim 2 wherein:

10 A' is carboxyl, sulfonyl, isothiocyanate, succinimidyl carboxylate, phosphoramidite, or amino;

 B' is carboxyl or sulfonyl;

 X' is hydrogen or chloro;

 Z₂, when taken alone, is hydrogen, methyl, ethyl, methoxy, ethoxy, or chloro;

15 Z₃, and Z₄ are separately hydrogen, methyl, ethyl, methoxy, ethoxy, chloro, carboxyl, sulfonyl, isothiocyanate, succinimidyl carboxylate, phosphoramidite, or methylamino;

 Z₅, when taken alone, is hydrogen, methyl, ethyl, methoxy, ethoxy, or chloro; and

 wherein only one of A', Z₃, and Z₄ is carboxyl, sulfonyl, methylamino, isothiocyanate, succinimidyl carboxylate, phosphoramidite, or amino.

20 4. The method of claim 3 wherein Z₃, and Z₄ are separately hydrogen, methyl, ethyl, methoxy, ethoxy, or chloro.

5. The method of claim 4 wherein Z₂, when taken alone, is hydrogen, methoxy, ethoxy, or chloro;

25 Z₃, and Z₄ are separately hydrogen, methoxy, ethoxy, chloro; and

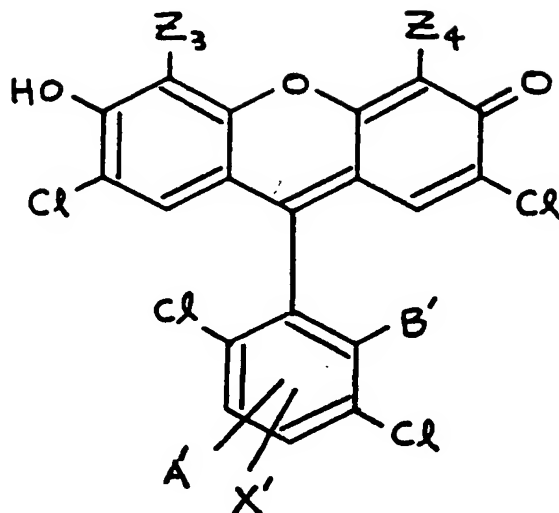
 Z₅, when taken alone, is hydrogen, methoxy, ethoxy, or chloro.

6. The method of claim 5 wherein B' is carboxy and A' is carboxy, succinimidyl carboxylate, or phosphoramidite.

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7. A compound having the formula:



wherein:

A' is hydrogen, fluoro, chloro, a linking functionality, or a group that may be converted to a linking functionality;

B' is fluoro, chloro, or an acidic anionic group;

X' is hydrogen, fluoro, or chloro;

Z3 and Z4 are separately hydrogen, halo, a linking functionality, or a group that may be converted to a linking functionality; and

wherein at least one of A', Z3, and Z4 is a linking functionality or a group that may be converted to a linking functionality.

8. The compound of claim 7 wherein A' is carboxyl, sulfonyl, isothiocyanate, succinimidyl, carboxylate, phosphoramidite, or amino; B' is carboxyl or sulfonyl; X' is hydrogen; Z3 and Z4 are separately hydrogen, halo, carboxyl, sulfonyl, or methylamino.

9. The compound of claim 8 wherein only one of A', Z3, and Z4 is carboxyl, sulfonyl, methylamino, or amino.

10. The compound of claim 9 wherein A' and B' are carboxyl, Z3 is hydrogen or chloro, and

Z₄ is hydrogen or chloro.

11. A kit for detecting a plurality of electrophoretically separated classes of DNA fragments comprising an oligonucleotide labelled with a 4,7-dichlorofluorescein dye.

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12. The kit of claim 11 further comprising:
an enzyme selected from the group consisting of nucleic acid polymerase and nucleic acid ligase; and
a reaction buffer.

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13. The kit of claim 12 wherein said enzyme is a nucleic acid polymerase and wherein said kit further includes a nucleoside triphosphate mix.

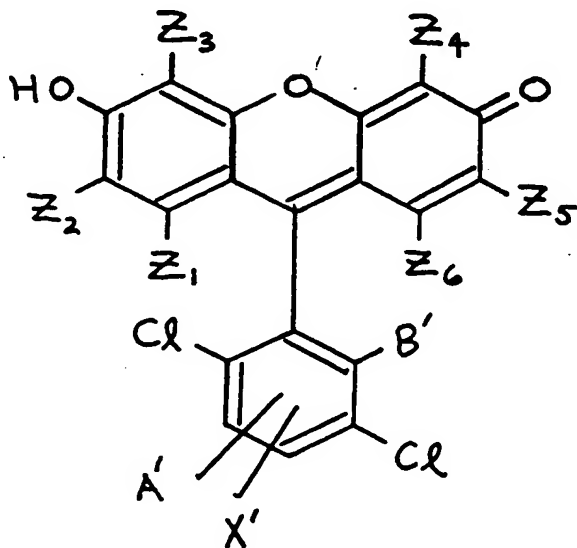
14. The kit of claim 12 wherein said enzyme is a nucleic acid ligase.

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15. A kit for sequencing DNA comprising:
an oligonucleotide labelled with a 4,7-dichlorofluorescein dye;
a nucleic acid polymerase;
a reaction buffer; and
a nucleoside triphosphate mix.

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16. The kit of claim 15 wherein said 4,7-dichlorofluorescein dye is defined by the formula:



wherein:

A' is hydrogen, fluoro, chloro, or a group that may be converted to a linking functionality;

B' is fluoro, chloro, or an acidic anionic group;

X' is hydrogen, fluoro, or chloro;

5 Z₁ is hydrogen or, when taken with Z₂, benzo;

Z₂, when taken alone, is hydrogen, halo, lower alkyl, lower alkyloxy, or a group that may be converted to a linking functionality, or when taken with Z₁, benzo;

Z₃ and Z₄ are separately hydrogen, halo, lower alkyl, lower alkyloxy, or a group that may be converted to a linking functionality;

10 Z₅, when taken alone, is hydrogen, halo, lower alkyl, lower alkyloxy, or a group that may be converted to a linking functionality, or when taken with Z₆, benzo;

Z₆ is hydrogen or, when taken with Z₅, benzo; and wherein at least one of A', Z₂, Z₃, Z₄, and Z₅ is a group that may be converted to a linking functionality.

15 17. The kit of claim 16 wherein:

A' and B' are carboxyl;

X' is hydrogen or chloro;

Z₂, when taken alone, is hydrogen, methyl, ethyl, methoxy, ethoxy, or chloro;

Z₃, and Z₄ are separately hydrogen, methyl, ethyl, methoxy, ethoxy, chloro; and

20 Z₅, when taken alone, is hydrogen, methyl, ethyl, methoxy, ethoxy, or chloro.

18. A kit for sequencing DNA comprising:

a dye-terminator mix wherein at least one dye-terminator is labelled with a 4,7-dichlorofluorescein dye;

25 a nucleic acid polymerase;

a nucleoside triphosphate mix; and

a reaction buffer.

19. The kit of claim 18 wherein said dye-terminator mix comprises dideoxynucleoside triphosphates selected from the group consisting of dideoxyadenosine triphosphate, dideoxycytidine triphosphate, dideoxyguanosine triphosphate, and dideoxythymidine triphosphate wherein each of said dideoxynucleoside triphosphates is separately labelled with a dye selected from the group consisting of 5- and 6-carboxyfluorescein, 5- and 6-carboxy-4,7-dichlorofluorescein, 2',7'-dimethoxy-5- and 6-carboxy-4,7-dichlorofluorescein, 2',7'-dimethoxy-4',5'-dichloro-5- and 6-carboxyfluorescein, 2',7'-dimethoxy-4',5'-dichloro-5- and 6-carboxy-4,7-

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dichlorofluorescein, 1',2',7',8'-dibenzo-5- and 6-carboxy-4,7-dichlorofluorescein, 1',2',7',8'-dibenzo-4',5'-dichloro-5- and 6-carboxy-4,7-dichlorofluorescein, 2',7'-dichloro-5- and 6-carboxy-4,7-dichlorofluorescein, and 2',4',5',7'-tetrachloro-5- and 6-carboxy-4,7-dichlorofluorescein.

- 5 20. The kit of claim 19 wherein said dideoxythymidine triphosphate is labelled with 6-carboxyfluorescein, said dideoxycytidine triphosphate is labelled with 2',4',5',7'-tetrachloro-5-carboxyfluorescein, said dideoxyadenosine triphosphate is labelled with 2',4',5',7'-tetrachloro-4,7-dichloro-5-carboxyfluorescein, and said dideoxyguanosine triphosphate is labelled with 1',2',7',8'-dibenzo-4,7-dichloro-5-carboxyfluorescein.

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21. The kit of claim 20 wherein said nucleic acid polymerase is Sequenase™.